

Knowledge, Attitude, and Practices about Biomedical Waste Management among Healthcare Personnel: A Cross-sectional Study

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ABSTRACT

Background: The waste produced in the course of healthcare activities carries a higher potential for infection and injury than any other type of waste. Inadequate and inappropriate knowledge of handling of healthcare waste may have serious health consequences and a significant impact on the environment as well. **Objective:** The objective was to assess knowledge, attitude, and practices of doctors, nurses, laboratory technicians, and sanitary staff regarding biomedical waste management. **Materials and Methods:** This was a cross-sectional study. **Setting:** The study was conducted among hospitals (bed capacity >100) of Allahabad city. **Participants:** Medical personnel included were doctors (75), nurses (60), laboratory technicians (78), and sanitary staff (70). **Results:** Doctors, nurses, and laboratory technicians have better knowledge than sanitary staff regarding biomedical waste management. Knowledge regarding the color coding and waste segregation at source was found to be better among nurses and laboratory staff as compared to doctors. Regarding practices related to biomedical waste management, sanitary staff were ignorant on all the counts. However, injury reporting was low across all the groups of health professionals. **Conclusion:** The importance of training regarding biomedical waste management needs emphasis; lack of proper and complete knowledge about biomedical waste management impacts practices of appropriate waste disposal.

Keywords: Biomedical waste management, hospital, medical professionals

Introduction

In the persuasion of the aim of reducing health problems, eliminating potential risks, and treating sick people, healthcare services inevitably create waste which itself may be hazardous to health. The waste produced in the course of healthcare activities carries a higher potential for infection and injury than any other type of waste. Inadequate and inappropriate knowledge of handling of healthcare waste may have serious health consequences and a significant impact on the environment as well.

It is estimated that annually about 0.33 million tonnes of hospital waste is generated in India and, the waste generation rate ranges from 0.5 to 2.0 kg per bed per day.⁽¹⁾ Wherever, generated, a safe and reliable method for handling of biomedical waste is essential. Effective management of biomedical waste is not only a legal necessity but also a social responsibility.

Though legal provisions [Biomedical Waste (management and handling) Rules 1998]⁽²⁾ exist to mitigate the impact of hazardous and infectious hospital waste on the community, still these provisions are yet to be fully implemented. The absence of proper waste management, lack of awareness about the health hazards from biomedical wastes, insufficient financial and human resources, and poor control of waste disposal are the most critical problems connected with healthcare waste.⁽³⁾ The hazardous impact of medical waste on the public and environment is enhanced manifold if adequate and

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appropriate handling of these wastes is not adopted. The hospital waste management has diverse ramifications as it not only affects the health of patients but also of healthcare workers (doctors, nurses, sanitary staff, etc.) and general public.

Although, there is an increased global awareness among health professionals about the hazards and also appropriate management techniques but the level of awareness in India is found to be unsatisfactory.⁽⁴⁻⁶⁾

Adequate knowledge about the health hazard of hospital waste, proper technique and methods of handling the waste, and practice of safety measures can go a long way toward the safe disposal of hazardous hospital waste and protect the community from various adverse effects of the hazardous waste. With this background, this study was conducted with the main objective of assessing knowledge, attitude, and practices of doctors, nurses, laboratory technicians, and sanitary staff regarding biomedical waste management.

Materials and Methods

The cross-sectional study was conducted as a part of a larger study of assessing biomedical waste management among hospitals with bed capacity >100 within Allahabad city. The study was conducted in 1 year. Study participants included healthcare personnel working in different departments of the hospitals. A total of 283 healthcare personnel consented for interview (93% response rate) which included 75 doctors, 60 nurses, 78 laboratory technicians, and 70 sanitary staff, who were interviewed and observed for biomedical waste management practices. These interviews and observations were conducted on a predesigned and a pretested questionnaire and checklist. All data forms underwent scrutiny for logical inconsistencies, skip patterns, and missing values. The data were coded and double entered into a relational database on Microsoft Access 2000. The data entry interface was designed to check for referential integrity, missing values, and

acceptability constraints. Errors identified at any level were referred back to the field for correction. The percentages and their 95% confidence intervals (CIs) have been being presented.

Results

In Allahabad city, majority of hospitals including government and private as well as nursing homes use a common private provider for the collection, management, and disposal of healthcare wastes and at times training regarding biomedical waste management to the healthcare personnel is arranged by the same common provider.

Analysis of data revealed that on all counts, doctors, nurses, and laboratory technicians have better knowledge than sanitary staff regarding biomedical waste management. Knowledge regarding the color coding and waste segregation at source was found to be better among nurses and laboratory staff as compared to doctors. Knowledge regarding the potential of transmission of diseases through biomedical waste was observed among only 27% sanitary staffs [Table 1].

Regarding practices related to biomedical waste management, sanitary staff were ignorant on all the counts. No sanitary staff ever reported any injury which would have occurred due to improperly disposed waste. However, injury reporting was low across all the groups of health professionals [Table 2].

Discussion

The study was conducted on predesigned and pretested questionnaire and a cross-sectional study design was selected as a similar design was adopted in other studies.^(4-6,7) Knowledge about biomedical waste management rules among the technically qualified personnel like the doctors, nurses, and laboratory staff was high but was low among the sanitary staff; this was similar to the findings from other studies.^(4,8) Similarly, knowledge about color coding of containers, and waste segregation

Table 1: Knowledge and attitude among healthcare personnel regarding biomedical waste management* (n = 283)

Knowledge regarding biomedical waste	Doctors (n = 75)	Nurses (n = 60)	Laboratory technicians (n = 78)	Sanitary staffs (n = 70)
Biomedical waste management rules	68 (90.7) (81.7–96.2)	55 (91.7) (81.6–97.2)	66 (84.6) (74.4–91.8)	18 (25.7) (16–37.6)
Color coding for waste containers	69 (92.0) (83.3–97)	56 (93.3) (83.8–98.2)	73 (93.6) (85.7–97.9)	29 (41.4) (29.8–53.8)
Segregation of waste at source	61 (81.3) (70.7–89.4)	51 (85.0) (73.4–92.9)	70 (89.7) (80.8–95.5)	26 (37.1) (25.9–49.5)
Disinfection of hospital waste before disposal	66 (88.0) (78.4–94.4)	47 (78.3) (65.8–87.9)	62 (79.5) (68.8–87.8)	32 (45.7) (33.7–58.1)
Transmission of disease through biomedical waste	70 (93.3) (85.1–97.8)	55 (91.6) (81.6–97.2)	59 (75.6) (64.6–84.7)	19 (27.1) (17.2–39.1)

*Multiple responses. Figures in parentheses are 95% confidence intervals (CIs)

Table 2: Practice of healthcare personnel regarding biomedical waste management* (n = 283)

Practices regarding biomedical waste	Doctors (n = 75)	Nurses (n = 60)	Laboratory technicians (n = 78)	Sanitary staff (n = 70)
Disposal in specified color-coded containers	58 (77.3) (66.2–86.2)	44 (73.3) (60.3–83.9)	61 (78.2) (67.4–86.8)	17 (24.2) (14.8–36.0)
Disposal of sharps in puncture-proof containers	49 (65.3) (53.5–76)	42 (71.6) (56.8–81.1)	54 (69.2) (57.8–79.2)	13 (18.6) (10.3–29.7)
Reporting of injuries due to improperly disposed sharps	47 (62.6) (50.7–73.6)	18 (30.0) (18.8–43.2)	10 (12.8) (6.3–22.3)	0 (0.0)

*Multiple responses. Figures in parentheses are 95% confidence intervals (CIs)

which itself is probably the most important pivotal point and crucial for further waste management, was also found to be better among the technically qualified staff as compared to that of the sanitary staff. Low level of knowledge is mainly attributed to poor training facilities and also to relatively low educational level of the sanitary staff. Training of both the technical staff and the nontechnical staff is critical for the proper and appropriate management of biomedical waste.^(4,6) The practice of reporting of injuries resulting from improperly disposed biomedical waste was found to be miserably low among the technical staff and was found to be completely absent among the nontechnical sanitary staff. Stein *et al.*⁽⁹⁾ in their study reported that among doctors and nurses, only 37% reported that they ever suffered needle stick injury. Low reporting of injuries may be attributed to the fact that most of the doctors and other technical and nontechnical staff are unaware about a formal system of injury reporting which should be established within all the health facilities.

Conclusion and Recommendations

Concluding from the results, the importance of training regarding biomedical waste management cannot be overemphasized; lack of proper and complete knowledge about biomedical waste management impacts practices of appropriate waste disposal.

Following recommendations are proposed: (i) strict implementation of biomedical waste management rules is the need of the hour, (ii) it should be made compulsory for healthcare facilities to get their healthcare personnel trained from accredited training centers. These training sessions should not become merely a one-time activity but should be a continuous process depending upon the patient input in different healthcare facilities, (iii) training of sanitary staff should be specially emphasized, and (iv) it should be ensured that the injuries happening to the healthcare personnel are reported to the person in-charge of biomedical waste

management or to the biomedical waste management committee, and they report it in the prescribed format to the pollution control board.

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